

WHAT IS CLAIMED IS:

1. A method of performing a non-ablative phototherapy on a sebaceous gland,  
the method comprising:  
transmitting a laser energy into the sebaceous gland; and  
5 heating the sebaceous gland to a temperature of at least forty degrees Celsius.
2. The method of claim 1, comprising maintaining the temperature of at least  
forty degrees Celsius for a predetermined time.
- 10 3. The method of claim 1, wherein the laser energy has a peak power greater  
than approximately 10 kW.
4. The method of claim 3, wherein the laser energy has a peak power pulse of  
approximately 14 kW.
- 15 5. The method of claim 1, wherein heating the sebaceous gland to a temperature  
of at least forty degrees Celsius comprises a temperature between approximately forty-five  
degrees Celsius and approximately fifty degrees Celsius.
- 20 6. The method of claim 1, wherein the laser energy comprises a fluence between  
approximately 8 J/cm<sup>2</sup> and approximately 20 J/cm<sup>2</sup>.
7. The method of claim 1, wherein transmitting the laser energy is carried out by  
pulsing the laser energy onto a skin surface of a patient.
- 25 8. The method of claim 7, wherein the laser energy has a pulse duration between  
approximately 100 microseconds and approximately 1000 microseconds.
9. The method of claim 1, wherein the laser energy is near infrared.
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10. The method of claim 9, wherein the laser energy has a wavelength of 1064 nm.

11. The method of claim 1, wherein heating comprises bulk heating through a surrounding epidermis and dermis.

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12. The method of claim 1, wherein heating comprises transient heating of sebaceous gland absorbers.

13. The method of claim 1, wherein heating for a predetermined time is sufficient to effect at least one of a reduction of a population of *P. Acnes* bacterium in the sebaceous gland, a reduction of a rate of sebum secretion in the sebaceous gland, and damage of the sebaceous gland.

14. The method of claim 1, wherein heating the sebaceous gland is carried out without the use of an exogenous chromophore.

15. A method of treating acne vulgaris, the method comprising:  
irradiating an area of a patient's skin with high peak power pulses of near infrared light to cause thermal heating to an underlying sebaceous gland, wherein the pulses comprise peak power of above 10 kW; and  
maintaining the irradiating of the area for a time period that is sufficient to treat the acne vulgaris.

16. The method of claim 15, wherein irradiating the area of the patient's skin effects transient heating of sebaceous gland absorbers.

17. The method of claim 15, wherein irradiating the area of the patient's skin effects bulk heating from thermal diffusion through absorbing structures in a surrounding epidermis and dermis.

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18. The method of claim 15, wherein the pulses of the near infrared light are continued until a predetermined minimum temperature is reached.

19. The method of claim 18, wherein a pulse duration of the near infrared light is  
5 between approximately 300 microseconds to approximately 1000 microseconds.

20. The method of claim 18, wherein the minimum temperature is between approximately forty degrees Celsius and approximately fifty degrees Celsius.

10 21. The method of claim 18, wherein a rate of repetition of the pulsing is between approximately 3 Hz and approximately 10 Hz.

22. The method of claim 15, wherein a fluence of the near infrared light is  
15 between approximately 8 J/cm<sup>2</sup> and approximately 20 J/cm<sup>2</sup>.

23. The method of claim 15, wherein the laser energy is generated by a Nd:YAG laser.

24. The method of claim 15, wherein the near infrared light has a wavelength of  
20 1064 nm.

25. The method of claim 15, wherein the time period is sufficient to effect at least one of a reduction of a population of a *p. acnes* bacterium in the sebaceous gland, a reduction of a rate of sebum secretion in the sebaceous gland, and damage of the sebaceous gland.  
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26. A method of treating acne vulgaris, the method comprising:  
pulsing a laser energy to heat a sebaceous gland, wherein the laser energy is transmitted into the sebaceous gland without the use of an exogenous chromophore;  
and

maintaining a temperature of the sebaceous gland between approximately forty degrees Celsius and approximately fifty degrees Celsius for a sufficient time to treat the acne vulgaris.

5           27.     The method of claim 26, wherein heating comprises effecting transient heating of a sebaceous gland absorber through diffuse propagation of a high peak power laser light through a patient's skin.

28.     The method of claim 26, wherein the laser energy is a near infrared laser light.

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29.     The method of claim 26, wherein heating comprises pulsing the laser energy.

30.     The method of claim 29, wherein a pulse duration of the near infrared laser light is between approximately 300 microseconds and approximately 1000 microseconds.

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31.     The method of claim 29, wherein the near infrared laser light is pulsed at repetition rates of between approximately 3 Hz and approximately 10 Hz.

32.     The method of claim 29, wherein the near infrared laser light has a fluence  
20 between approximately 8 J/cm<sup>2</sup> and approximately 20 J/cm<sup>2</sup>.

33.     An acne treatment device comprising:

          a laser source that generates laser light comprising a peak power above approximately 10kW;

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          an applicator coupled to the laser source that is configured to deliver the laser light onto an area of a patient's skin; and

          wherein the laser light comprises a wavelength that allows thermal heating of an underlying sebaceous gland.

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34.     The device of claim 33, comprising a controller that is configured to deliver the laser light in pulses.

35. The device of claim 34, wherein the controller is configured to provide a pulse duration of the laser light between approximately 300 microseconds and approximately 1000 microseconds.

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36. The device of claim 34, wherein the laser light is pulsed at repetition rates of between approximately 3 Hz and approximately 10 Hz.

37. The device of claim 34, wherein the laser light pulses have a fluence between  
10 approximately 8 J/cm<sup>2</sup> and approximately 20 J/cm<sup>2</sup>.

38. The device of claim 34, wherein the laser light source is a Nd:YAG laser.

39. The device of claim 34, wherein the laser light has a wavelength of 1064  
15 nanometers.

40. An acne treatment device comprising:  
controller means for transmitting a laser energy into the sebaceous gland; and  
means for heating the sebaceous gland to a temperature of at least forty  
20 degrees Celsius for a predetermined time.

41. A method of performing a non-ablative phototherapy to a patient's skin, the method comprising:  
transmitting a laser energy into a target tissue, the laser energy including  
25 pulses of light having a fluence of 8 J/cm<sup>2</sup> and 20 J/cm<sup>2</sup>, and a pulse width of in the range of approximately 100 μseconds and 3000 μseconds; and  
heating the target tissue to a temperature of at least forty degrees Celsius.

42. The method of claim 41, comprising maintaining the temperature of at least  
30 forty degrees Celsius for a predetermined time.

43. The method of claim 41, wherein the laser energy has a peak power greater than approximately 10 kW.

44. The method of claim 43, wherein the laser energy has a peak power pulse of  
5 approximately 14 kW.

45. The method of claim 41, wherein heating the target tissue to a temperature of at least forty degrees Celsius comprises a temperature between approximately forty-five degrees Celsius and approximately fifty degrees Celsius.

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46. The method of claim 41, wherein the laser energy comprises a fluence between approximately 10 J/cm<sup>2</sup> and approximately 20 J/cm<sup>2</sup>.

47. The method of claim 41, wherein transmitting the laser energy is carried out  
15 by pulsing the laser energy onto a skin surface of a patient.

48. The method of claim 47, wherein the laser energy has a pulse duration between approximately 100 microseconds and approximately 1000 microseconds.

20 49. The method of claim 41, wherein the laser energy is near infrared.

50. The method of claim 49, wherein the laser energy has a wavelength of 1064 nm.

25 51. A non-ablative method of smoothing wrinkles, the method comprising:  
transmitting a laser energy into a target tissue; and  
heating the target tissue to a temperature of at least forty degrees Celsius to effect smoothing of wrinkles on an exposed surface of the target tissue.

30 52. The method of claim 51, comprising maintaining the temperature of at least forty degrees Celsius for a predetermined time.

53. The method of claim 51, wherein the laser energy has a peak power greater than approximately 10 kW.

5 54. The method of claim 53, wherein the laser energy has a peak power pulse of approximately 14 kW.

55. The method of claim 51, wherein heating the target tissue to a temperature of at least forty degrees Celsius comprises a temperature between approximately forty-five  
10 degrees Celsius and approximately fifty degrees Celsius.

56. The method of claim 51, wherein the laser energy comprises a fluence between approximately 8 J/cm<sup>2</sup> and approximately 20 J/cm<sup>2</sup>.

15 57. The method of claim 51, wherein transmitting the laser energy is carried out by pulsing the laser energy onto a skin surface of a patient.

58. The method of claim 57, wherein the laser energy has a pulse duration between approximately 100 microseconds and approximately 1000 microseconds.  
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59. The method of claim 51, wherein the laser energy is near infrared.

60. The method of claim 59, wherein the laser energy has a wavelength of 1064 nm.  
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61. The method of claim 41, wherein heating effects a reduction of wrinkles.

62. The method of claim 41, wherein heating effects a texturing of a surface of the skin.  
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63. The method of claim 41, wherein heating effects a reduction of scar tissue.

64. The method of claim 41, wherein heating effects a reduction of diffuse redness in the skin.

5 65. The method of claim 41, wherein heating effects a reduction in a size of a pore.

66. The method of claim 41, wherein heating effects a reduction of striae in the skin.

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67. A method of providing a phototherapy treatment to an area of skin, the method comprising:

generating a plurality of pulses of light;

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directing the plurality of pulses of light to a surface of an area of tissue being treated; and

wherein each pulse has a fluence of between approximately 8 J/cm<sup>2</sup> and 20 J/cm<sup>2</sup>, and has a pulse duration of between approximately 100 μseconds and 1000 μseconds.

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68. The method of claim 67, further comprising:

selecting a dimension of the pulses of light such that the pulses of light directed to the area of tissue produces a spot size on a surface of the area of tissue being treated of between approximately 3 mm and 10 mm.

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69. The method of claim 67, further comprising:

selecting a dimension of the pulses of light such that the pulses of light directed to the area of tissue produce a spot size on a surface of the area of tissue being treated of approximately 5 mm.



70. The method of claim 67, wherein the generating a plurality of pulses of light includes generating the pulses of light at a repetition rate in a range of between approximately 2 hz and 12 hz.

5 71. The method of claim 67, wherein the generating a plurality of pulses of light includes generating the pulses of light at a repetition rate a range of between approximately 5 hz and 7 hz.

72. The method of claim 67, further comprising:  
10 wherein the directing of the plurality of pulses of light to the surface of the area of tissue being treated, includes continuing the directing so that a treatment pedestal temperature in the tissue being treated is reached, and after reaching the treatment pedestal temperature continuing the directing of the plurality of pulses of light to the surface of the area tissue being treated such that a plurality of treatment  
15 temperature spikes are produced in the tissue.

73. The method of claim 67, wherein the pulses of light include light in the near infrared range.

20 74. The method of claim 67, wherein the pulses of light have a wavelength of approximately 1064 nm.

75. The method of claim 67, wherein the pulses of light are generated by a YAG  
25 laser.

76. The method of claim 67, further comprising:  
continuing the directing of the plurality of pulses light to the surface of the area of tissue being treated such that hemoglobin in the tissue area absorbs sufficient energy to reduce a diffuse redness in skin.  
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77. The method of claim 67, further comprising:

continuing the directing of the plurality of pulses light to the surface of the area of tissue being treated such that treatment provides for at least one of the following group of treatments to the skin: facial vein reduction, improvement of skin texture, decrease of pore size, reduction of rosacea, reduction of diffuse redness, reduction of striae, and reduction of scarring.

78. The method of claim 67, further comprising:

continuing the directing of the plurality of pulses light to the surface of the area of tissue being treated such that hemoglobin absorbs sufficient energy to cause thermal damage sufficient to treat blood vessels.

79. The method of claim 67, further comprising:

continuing the directing of the plurality of pulses light to treat blood vessels in the area of tissue being treated.

80. The method of claim 67, wherein the pulses of light have a power of at least 10kW.

81. A method of providing a non-ablative treatment to an area of skin, the method comprising:

selecting the area of skin for treatment the area of skin being greater than approximately  $2\text{cm}^2$ ;

providing a light source that outputs pulses of light having a fluence of greater than approximately  $8\text{ J/cm}^2$  and less than approximately  $20\text{ J/cm}^2$ , and a pulse width of between approximately  $100\text{ }\mu\text{seconds}$  and  $1000\text{ }\mu\text{seconds}$ ;

applying pulses of light from the light source to the area skin, wherein each pulse of light applied to the skin produces a light spot on the skin, and a spot size covers a portion of the area of skin being treated; and

moving the light source to distribute pulses of light over the area skin being treated.

82. The method of claim 81, wherein the spot size is between approximately 3 mm to 10 mm.

5 83. The method of claim 81, wherein pulses of light are generated at a frequency in the range of approximately 2 hz to 12 hz.

84. The method of claim 81, wherein the pulses of light include light in the near infrared range.

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85. The method of claim 81, wherein the pulses of light are generated by an Nd:YAG laser.

86. The method of claim 81, wherein the pulses of light have a wavelength of  
15 1064 nm.

87. The method of claim 81, wherein the light pulses operate to treat blood vessels in the selected area of skin.

20 88. The method of claim 81, wherein the light pulses operate to reduce diffuse redness in the selected area of skin.

89. The method of claim 81, further comprising:

25 continuing the applying pulses of light from the light source to the area skin, such that the pulse of light generate a treatment temperature pedestal in the skin, and after the treatment temperature pedestal has been reached continuing the applying of pulses of light to the skin to create a plurality of treatment temperature spikes in the area of skin.

30 90. The method of claim 81, wherein the area of skin selected for treatment is an area of approximately 20 cm<sup>2</sup>.

91. The method of claim 81, wherein at least approximately 400 pulses of light are applied to the selected area of skin for treatment.

5 92. The method of claim 81, wherein pulses are applied to the selected area of tissue continuously for a time period in the range of approximately 1 minute to 5 minute.

93. The method of claim 81, wherein the selected the area of skin for treatment is in the range of approximately 20 cm<sup>2</sup>.

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94. A method of performing a non-ablative phototherapy to a patient's skin, the method comprising:

applying a light energy to a selected treatment area to heat the selected treatment area to a treatment pedestal temperature;

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generating localized temperature spikes in a target tissue in the selected treatment area.

95. The method of claim 94, further comprising:

continuing the applying of light energy to the surface of the selected treatment area such that phototherapy provides for at least one of the following group of treatments to the skin: facial vein reduction, improvement of skin texture, decrease of pore size, reduction of rosacea, reduction of diffuse redness, reduction of striae, and reduction of scarring.

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25 96. The method of claim 94, wherein the selected treatment area is an area of at least 2 cm<sup>2</sup>, and applying light energy to the selected treatment area includes:

generating pulses of light energy having a spot size on a portion of the selected treatment area of less than the selected treatment area;

distributing the pulses of light energy having over the selected treatment area.

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97. The method of claim 96, wherein pulses of light are applied to the selected treatment area for a time period of between approximately 1 minute to 5 minutes.

98. The method of claim 96, wherein more than approximately 400 pulses are  
5 applied to the selected area.

99. The method of claim 96, wherein the spot size is less than approximately  
11 mm.

10 100. The method of claim 96, wherein each of the pulses has fluence of between 8 J/cm<sup>2</sup> and 20 J/cm<sup>2</sup> and has a pulse duration of between approximately 100 μseconds and 3000 μseconds.